

What is claimed is:

1. A refrigeration system comprising:

a plurality of compressors, the plurality of compressors having a plurality of predetermined operating configurations, wherein each predetermined operating configuration of the plurality of predetermined operating configurations results in a predetermined output capacity for the refrigeration system;

a condenser in fluid communication with the plurality of compressors;

at least one evaporator in fluid communication with the condenser and with the plurality of compressors;

a control system to control the plurality of compressors in response to a required output capacity for the refrigeration system, the control system being configured to select a predetermined operating configuration from the plurality of predetermined operating configurations that most efficiently satisfies the required output capacity for the refrigeration system; and

wherein each compressor of the plurality of compressors having a plurality of discrete output capacities and each predetermined operating configuration for the plurality of compressors includes an operational state for each compressor of the plurality of compressors and a discrete output capacity for each operating compressor.

2. The refrigeration system of claim 1 wherein the at least one evaporator comprises a plurality of evaporators and a total number of the plurality of evaporators is equal to a total number of the plurality of predetermined operating configurations.
3. The refrigeration system of claim 2 wherein the control system includes a memory to store the plurality of predetermined operating states and the plurality of predetermined operating states are identified in sequence in the memory in an order of increasing output capacity.
4. The refrigeration system of claim 3 wherein a preselected number of evaporators of the plurality of evaporators are operated by the control system in response to

the selected predetermined operating configuration of the plurality of compressors and the preselected number of evaporators corresponds to the sequence identifier for the selected predetermined operating configuration of the plurality of compressors.

5. The refrigeration system of claim 1 wherein each compressor of the plurality of compressors comprises a dual capacity compressor having a first discrete output capacity and a second discrete output capacity.
6. The refrigeration system of claim 5 wherein the plurality of compressors comprises a first compressor and a second compressor.
7. The refrigeration system of claim 6 wherein the plurality of predetermined operating conditions comprises eight operating conditions.
8. The refrigeration system of claim 7 wherein the eight operating conditions are configured to provide eight discrete steps of output capacity for the refrigeration system.
9. The refrigeration system of claim 6 wherein the first compressor and the second compressor are reciprocating compressors.
10. The refrigeration system of claim 5 wherein the second discrete output capacity is greater than the first discrete output capacity and the second discrete output capacity for the first compressor is greater than the second discrete output capacity for the second compressor.
11. A method of controlling operation of a plurality of multi-capacity compressors in a refrigeration system, the method comprising the steps of:
  - providing a refrigeration system having a plurality of multi-capacity compressors, a condenser and a plurality of evaporators connected in a closed refrigerant circuit;
  - determining an amount of output capacity required by the refrigeration system;
  - determining a configuration of the plurality of multi-capacity compressors having a predetermined output capacity to satisfy the determined amount of required output capacity, each multi-capacity

compressor of the plurality of multi-capacity compressors having a plurality of discrete output capacities, wherein the determined configuration of the plurality of multi-capacity compressors includes an operational state for each compressor of the plurality of multi-capacity compressors and a discrete output capacity for each operating multi-capacity compressor; and

generating control instructions corresponding to the determined configuration of the plurality of multi-capacity compressors to control the plurality of multi-capacity compressors to generate the predetermined output capacity for the refrigeration system.

12. The method of claim 11 wherein the step of determining a configuration of the plurality of multi-capacity compressors includes the step of selecting a configuration of the plurality of multi-capacity compressors from a plurality of configurations of the plurality of multi-capacity compressors, wherein each configuration of the plurality of configurations corresponds to a predetermined output capacity of the refrigeration system.
13. The method of claim 12 further comprising the step of storing the plurality of configurations of the plurality of multi-capacity compressors in a table.
14. The method of claim 13 wherein the step of selecting a configuration of the plurality of multi-capacity compressors includes the step of selecting a configuration of the plurality of multi-capacity compressors from the table.
15. The method of claim 12 wherein the plurality of evaporators includes an evaporator for each configuration of the plurality of multi-capacity compressors of the plurality of configurations of the plurality of multi-capacity compressors.
16. The method of claim 15 wherein the step of selecting a configuration of the plurality of multi-capacity compressors includes the step of selecting a configuration of the plurality of multi-capacity compressors corresponding to an active number of evaporators of the plurality of evaporators.